ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

An Intelligent Health Care IoT Platform

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ABSTRACT: Care of critically ill patient requires fast & accurate treatment. This can be possible when treatment will start in time. This proposed system is developed to monitor patients which is based on IoT platform. The parameters sensed by the sensors and transfer the readings to smart phone available to doctor and simultaneously the data can be access through web page. Which is helpful for doctor to monitor the patient from anywhere and at any time. Indicators are available near to the patient, which is useful for person near to the patient to gets idea about patient's health in real time. Patient can get proper treatment in comfortable home environment.

KEYWORDS: Heartbeat sensor, Ethernet shield, Android application.

I. INTRODUCTION

Now a day's, number of critically ill patients are increasing day by day. Many countries are preferring hospital restructuring by reducing the number of hospital beds and increasing the proportion of smart healthcare. A challenging work in healthcare is to move routine medical checkups and other healthcare services from hospital to the comfort environment. If the large number of patient present hospital then it is difficult to take proper care of them. Proposed system help for the ill person can get seamless healthcare at anytime in a comfortable home environment. In smart healthcare systems and services can drastically reduce the total expenditure on medical care or treatment [1]. A technical improvement in healthcare facilities and services provides requirements to society. IoT technology provides connections of sensors or other devices to the Internet which extends the Internet into our day to day life by wirelessly connecting various smart objects and will bring significant changes in our life. IoT system provides treatment to patient in the home environment for 24/7 healthcare [2].

II. RELATED WORK

In [3] author has mentioned system in which for monitoring patients remotely GSM network has been used. Patient monitoring system measure physiological characteristics either continuously or at regular intervals of time. In [4] author has developed a system based on wireless sensor networks for monitoring patient's physiological condition continuously using Zigbee. The measured signal has to be send to computer system where the data has been collect. In [5] author has execute a system which was uses wireless technologies to transmit vital signs for medical evaluation. In a Zigbee network the existing systems usually used broadcast or multicast schemes to increase the reliability of signal transmission. In [6] author has explained that health care systems read patient's vital signs with sensors and collect vital signs in sensors with Bluetooth devices. It reviews Bluetooth techniques for healthcare system. The android provides APIs with which can easily build up a Bluetooth network. In [7] author has designed and developed a reliable, energy efficient remote patient monitoring system which was based on ZigBee, GSM. It enables doctors to monitor patient's temperature, heartbeat in real time.

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III. PROPOSED SYSTEM

Proposed system consists of temperature and heartbeat rate sensors, Arduino Uno with Ethernet shield, indicators such as buzzer and LEDs. Figure 1 illustrate conceptual diagram of it.

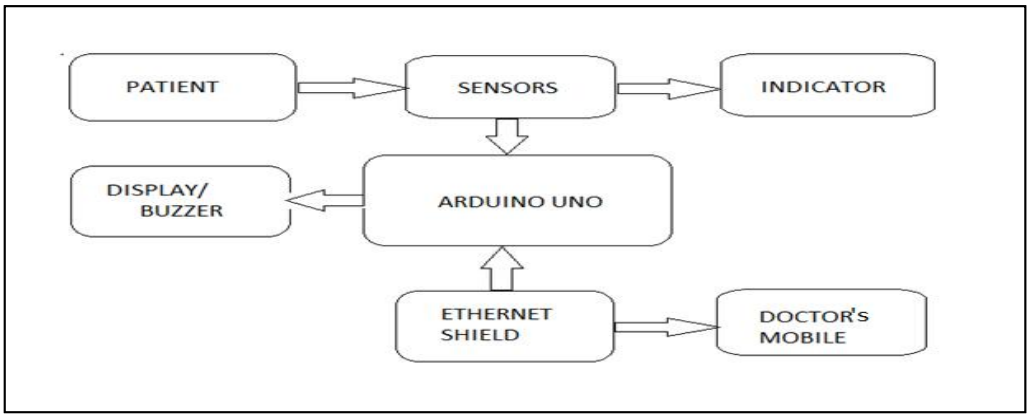

Figure 1 : System Overview

An intelligent healthcare IOT platform is a system in which the parameters of patient's sensed by sensors and is transmitted to doctor's android device through ethernet shield.

A. *Sensors* : For geeting parameters for patient temperature sensor (LM35) and heartbeat rate sensor (KY039) are used. These sensors are interfaced with microcontroller available on arduino board. Temperature sensor sense body temperature of patient in Celsius (Centigrade). Heartbeat rate sensor measures heartbeat rate of patient.

B. *Arduino UNO:* It having Atmega328 controller used to control and monitor overall system. The programming part is developed in open-source IDE software. Arduino UNO R3 is used for it.

C. *Ethernet shield :* It is used to connect Arduino to internet. It has IC named as Wiznet W5100 provides network (IP) stack capable of both TCP and UDP. There is on board micro-SD card slot.

IV. SIMULATION AND RESULT

The readings of sensors will display on the web page through which doctor can monitor the patient whether the doctor is available or not near to the patient. The snapshot of web page is given in figure 2.

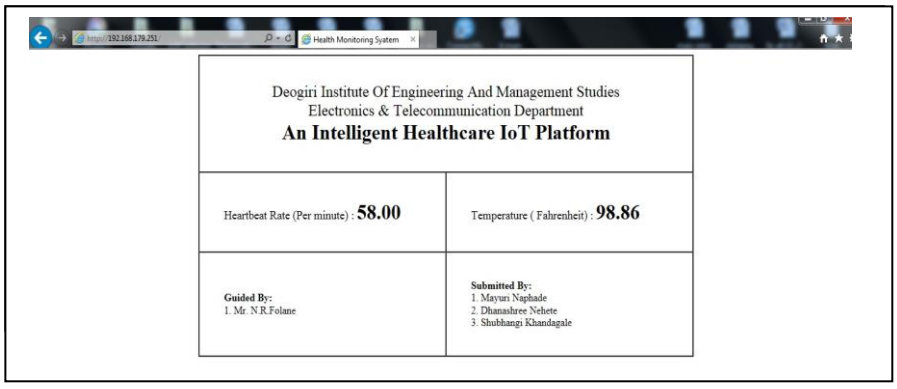

Figure 2: Online output of system

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Ethernet shield is used in the system which transmits output data on web page. The refresh time of 3secs has been given for changing and updating dynamic values of temperature and heartbeat rate. At particular IP address the web page is available as given in figure 2.
For experimental purpose readings of different persons has been taken. The analysis of four person's parameters is shown in table 1.

Sr.No.	Temperature in Fahrenheit	Heartbeat rates per minute
Person1	98.67	61
Person2	94.8	69
Person3	96.91	58
Person4	103.22	64

Table 1: Tabular analysis of parameters.

Comparison of both temperature and heartbeat rate of four persons has been made. The comparison graph is shown in figure 3. Red point's shows body temperatures of different patients which are in Fahrenheit and green shows their heartbeats rate per minute. The graph shown in figure 3 is obtained from readings shown in tabular analysis of parameters.

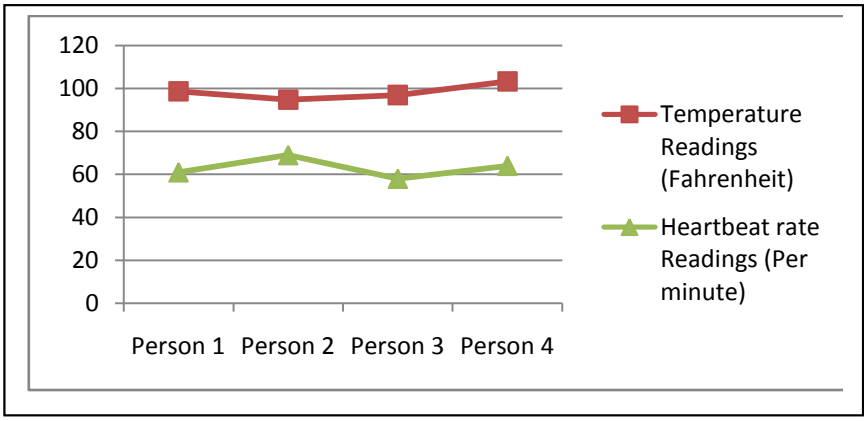

Figure 3 : Combine graph of Temperature and Heartbeat rate readings

V. CONCLUSION AND DISCUSSION

When there are so many patients come to hospital for some viral infection spread due to the environmental effect then, crowed of patient in hospital get increase. Due to this many times it happens that hospital rooms get fully loaded with patient. Many times it happens that the patient who need immediate treatment with serious condition cannot get proper treatment on time because of some patients who are only under observation but not in serious condition. In such case these type of health monitoring systems can be used by arranging medical setup at patient's home. So that such patient can get comfortable home environment treatment with reduced cost. This leads to get in time treatment for serious patient. Due to implementation of this system we can reduce number of hospital beds, by doing so, patient can get seamless health care at any time in comfortable home environment and also society's financial burden would be greatly reduce.

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